

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A speech encoding method comprising:
adding a first signal from an adaptive codebook, which stores a past low-pass filtered excitation signal, and a second signal from a second codebook to generate an excitation signal;
~~generating an excitation signal using an adaptive codebook, which stores a past modified excitation signal, and a second codebook;~~
generating a synthesized speech signal using the excitation signal;
~~modifying filtering the excitation signal by filter processing that is executed by an~~
through a short-term excitation filter having low-pass characteristics to produce a low-pass filtered excitation signal; and
storing the ~~modified~~ low-pass filtered excitation signal in the adaptive codebook.
2. (Canceled)
3. (Currently Amended) A method according to claim 1, wherein the ~~modifying filtering~~ step is performed by a recursive filter expressed by $R(z) = 1/(1 - k_1 z^{-1})$ (k₁: filter coefficient) in a z-transform domain.
4. (Canceled)

5. (Currently Amended) A speech encoding method comprising:

selecting code information representing a first code vector by using an adaptive codebook so as to reduce perceptually weighted distortion between a target vector obtained from an input speech signal and a synthesized vector;

selecting code information representing a second code vector from a second codebook so as to reduce perceptually weighted distortion of a synthesized speech signal;

adding a first signal from the first code vector and a second signal from the second code vector to generate an excitation signal;

~~generating an excitation signal by using the selected code information representing the first and second code vectors;~~

generating a synthesized speech signal using the excitation signal;

filtering the excitation signal through a short-term excitation filter having low-pass characteristics to produce a low-pass filtered excitation signal; and

~~modifying the generated excitation signal by filter processing which is executed by an excitation filter having low-pass characteristics; and~~

storing the ~~modified~~ low-pass filtered excitation signal in the adaptive codebook.

6. (Currently Amended) A method according to claim 5, wherein the ~~modifying~~ filtering step is performed by a recursive filter expressed by $R(z) = 1/(1 - k_1 z^{-1})$ (k_1 : filter coefficient) in a z-transform domain.

7. (Canceled)

8. (Currently Amended) A speech decoding method comprising:
adding a first signal from an adaptive codebook, which stores a past low-pass filtered excitation signal, and a second signal from a second codebook to generate an excitation signal;
~~generating an excitation signal using an adaptive codebook, which stores a past modified excitation signal, and a second codebook;~~
generating a synthesized speech signal using the excitation signal;
~~modifying the excitation signal by filter processing which is executed by an excitation filter having low-pass characteristics; and~~
filtering the excitation signal through a short-term excitation filter having low-pass characteristics to produce a low-pass filtered excitation signal; and
storing the ~~modified~~ low-pass filtered excitation signal in the adaptive codebook.

9. (Canceled)

10. (Currently Amended) A method according to claim 8, wherein the ~~modifying~~ filtering step is performed by a recursive filter expressed by $R(z) = 1/(1 - k_1 z^{-1})$ (k₁: filter coefficient) in a z-transform domain.

11. (Canceled)

12. (Previously Presented) An electronic apparatus comprising:
a speech encoder configured to execute the speech encoding method according to claim 1; and
a speech input device configured to supply a speech signal to the speech encoder.

13. (Previously Presented) An electronic apparatus comprising:
a speech decoder configured to execute the speech decoding method according to claim 8; and
a speech output device configured to output a speech signal from the speech decoder.

14. (Currently Amended) An electronic device comprising:
a speech encoder configured to execute the speech encoding method according to claim 1;
a speech decoder configured to execute a speech decoding method comprising:
adding a first signal from an adaptive codebook, which stores a past low-pass filtered excitation signal, and a second signal from a second codebook to generate an excitation signal;
~~generating an excitation signal using an adaptive codebook, which stores a past modified excitation signal, and a second codebook;~~
generating a synthesized speech signal using the excitation signal;

~~modifying the excitation signal by filter processing which is executed by an excitation filter having low-pass characteristics; and~~

filtering the excitation signal through a short-term excitation filter having low-pass characteristics to produce a low-pass filtered excitation signal; and

storing the ~~modified~~ low-pass filtered excitation signal in the adaptive codebook.

15 - 17. (Canceled)

18. (Currently Amended) A speech encoding apparatus comprising:
an adaptive codebook configured to store a past ~~modified~~ low-pass filtered excitation signal;

a second codebook configured to generate a second signal;

an adder configured to add a first signal from the adaptive codebook and a second signal from the second codebook to generate an excitation signal;

a synthesis filter configured to generate a synthesized speech signal using the excitation signal; and

a short-term excitation filter having low-pass characteristics configured to filter the excitation signal and produce a low-pass filtered excitation signal to be stored in the adaptive codebook.

~~a generator configured to generate an excitation signal using the adaptive codebook and the second codebook; and~~

~~an excitation filter having low-pass characteristics configured to modify the excitation signal by filter processing and generate a modified excitation signal to be stored in the adaptive codebook.~~

19. (Currently Amended) A speech encoding apparatus comprising:
- a first codebook configured to store a past ~~modified~~ low-pass filtered excitation signal and generate a first code vector;
 - a second codebook configured to generate a second code vector;
 - a first code vector selector configured to select a code vector representing the first code vector from the first codebook so as to reduce perceptually weighted distortion between a target vector obtained from an input speech signal and a synthesized vector obtained from a candidate vector of the first code vector;
 - a second code vector selector configured to select a code vector representing the second code vector from the second codebook so as to reduce perceptually weighted distortion of a synthesized speech signal;
 - ~~an excitation signal generator configured to generate an excitation signal from the selected first and second code vectors; and~~
 - ~~an excitation signal modifier having low-pass characteristics configured to modify the excitation signal by filter processing, and generate a modified excitation signal to be stored in the first codebook.~~
 - an adder configured to add a first signal from the selected first code vector and a second signal from the selected second code vectors to generate an excitation signal;

a synthesis filter configured to generate a synthesized speech signal using the excitation signal; and

a short-term excitation filter having low-pass characteristics configured to filter the excitation signal and produce a low-pass filtered excitation signal to be stored in the adaptive codebook.

20. (Currently Amended) A speech decoding apparatus comprising:
- an adaptive codebook configured to store a past modified low-pass filtered excitation signal and configured to generate a first signal;
 - a second codebook configured to generate a second signal;
 - ~~a signal generator configured to generate an excitation signal using the adaptive codebook and the second codebook; and~~
 - ~~an excitation filter having low-pass characteristics configured to modify the excitation signal by filter processing and generate a modified excitation signal to be stored in the adaptive codebook.~~
 - an adder configured to add the first signal and the second signal to generate an excitation signal;
 - a synthesis filter configured to generate a synthesized speech signal using the excitation signal; and
 - a short-term excitation filter having low-pass characteristics configured to filter the excitation signal and produce a low-pass filtered excitation signal to be stored in the adaptive codebook.

21. (Currently Amended) An electronic apparatus comprising:
a speech encoder according to claim 18; and
a speech input device configured to supply a speech signal to the speech
~~encoder~~ encoding apparatus.
22. (Currently Amended) An electronic apparatus comprising:
a speech decoder according to claim 20; and
a speech output device configured to output a speech signal from the speech
~~decoder~~ decoding apparatus.
23. (Currently Amended) An electronic device comprising:
a speech ~~encoder~~ encoding apparatus according to claim 18;
a speech ~~decoder~~ decoding apparatus comprising:
an adaptive codebook configured to store a past ~~modified~~ low-pass filtered
excitation signal and configured to generate a first signal;
a second codebook configured to generate a second signal;
~~a signal generator configured to generate an excitation signal using the~~
~~adaptive codebook and the second codebook; and~~
~~an excitation filter having low-pass characteristics configured to modify the~~
~~excitation signal by filter processing and generate a modified excitation signal to be~~
~~stored in the adaptive codebook;~~
an adder configured to add the first signal and the second signal to
generate an excitation signal;

a synthesis filter configured to generate a synthesized speech signal using the excitation signal;

a short-term excitation filter having low-pass characteristics configured to filter the excitation signal and produce a low-pass filtered excitation signal to be stored in the adaptive codebook;

a speech input device configured to supply a speech signal to the speech encoder encoding apparatus; and

a speech output device configured to output a speech signal from the speech ~~decoder~~ decoding apparatus.

24. (Canceled)

25. (Currently Amended) A method according to claim 1, wherein the second codebook ~~stores~~ is a stochastic ~~code-vector~~ codebook.

26 - 27. (Canceled)

28. (Currently Amended) A method according to claim 8, wherein the second codebook ~~stores~~ is a stochastic ~~code-vector~~ codebook.

29 - 30. (Canceled)

31. (Currently Amended) A speech encoding apparatus according to claim 18, wherein ~~the adaptive codebook configured to generate an adaptive code vector~~ the first signal is an adaptive code vector multiplied by a gain; and
the second codebook ~~configured to generate~~ is a stochastic vector codebook.